NOVEL APPROACH ON APPLICATION OF AN EXTREMOPHILIC RED ALGA *CYANIDIOSCHYZON MEROLAE* IN PHYTOREMEDIATION

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Nowadays, water pollution and bioremediation are the most important issue. Scientists endeavouring and trying to discover novel methods for removing pollutants from water or clean sludges for reuse contaminated waters. Most of the mentioned environmental hazards are created in human environment, like acid and metalliferous drainage that also contain heavy metals. Acidic and eutrophic waters can determine further dangerous conditions for biodiversity as increase of biogenic elements or acidity of ground and sea waters. Organisms, especially those one that can thrive in naturally polluted habitats, can give us a great possibility to use their features for understanding cleaning, transforming and removing processes [1].

One of the possibilities of reducing toxicity of waste is to apply microorganisms in bioremediation. Thus, the best opportunity is to use relevant organisms with a wide spectrum of activity and adaptation to harmful conditions (e.g., extremophiles).

Cyanidioschyzon merolae is a red microalgae, which is the one of the most primitive algae, naturally exist in sulphate-rich hot springs habitat (pH 1.5, at 45 – 56 °C) associated with high heavy metal concentrations [2, 3]. In this research, we present the first steps to assess the bioremediation potential of C. merolae. We measured cell survivability in the presence of selected high salt concentrations at two growth temperatures (42 °C and 25 °C). It is worth to mention that this research firstly introduce a new cell strain of Cyanidioschyzon merolae based on the NIES-1332 strain (Microbial Culture Collection from the National Institute for Environmental Studies (Tsukuba, Japan)), which is adapted to vary pH and capable of being effective growth under pH conditions in the range of 2.5 to 6.7. Likewise, it can be cultivated in temperature range 25 – 65 °C, although the optimal range is 40 – 42 °C.

Our research implies new facet to cope with such peculiar pollution with a different pH range. (This research is based on Patent notification by Polish Patent Office: No. P.432684).

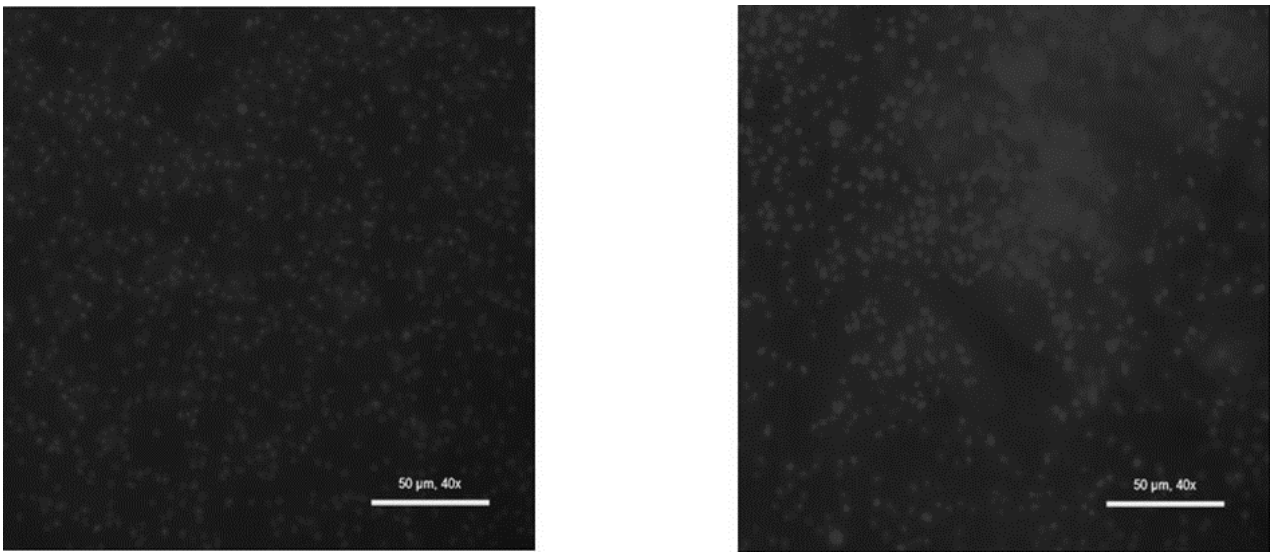

Fig. 1. Fluorescence microscopy images of chlorophyll emissions from C. merolae cells cultured at different pH: (a) 2.5 (b) >6.

We discovered differences between cells in varying pH conditions, for instance the size and shape (in Fig. 1). Microscopic analysis was performed via LS720 fluorescence microscope (Etaluma) at 40x magnification and chlorophyll excitation at 580 – 598 nm. 50 µM scale. Both micrographs show fluorescence of individual chloroplasts in C. merolae cells, thus, showing cell viability in both cultures.

In conclusions, this preliminary data and new cell strain open further possibilities of investigation of bioremediation potential of C. merolae.

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[3] P. De Luca, et al. Cyanidioschyzon merolae a new alga of thermal acidic environments. Journal of Plant Taxonomy and Geography **31** (1978).